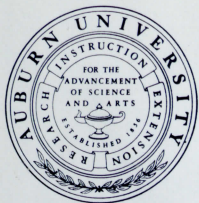


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GEORGE ALLEN THOMAS, State Geologist

BULLETIN NO. 14

STATISTICS OF THE MINERAL
PRODUCTION OF ALABAMA
FOR 1912

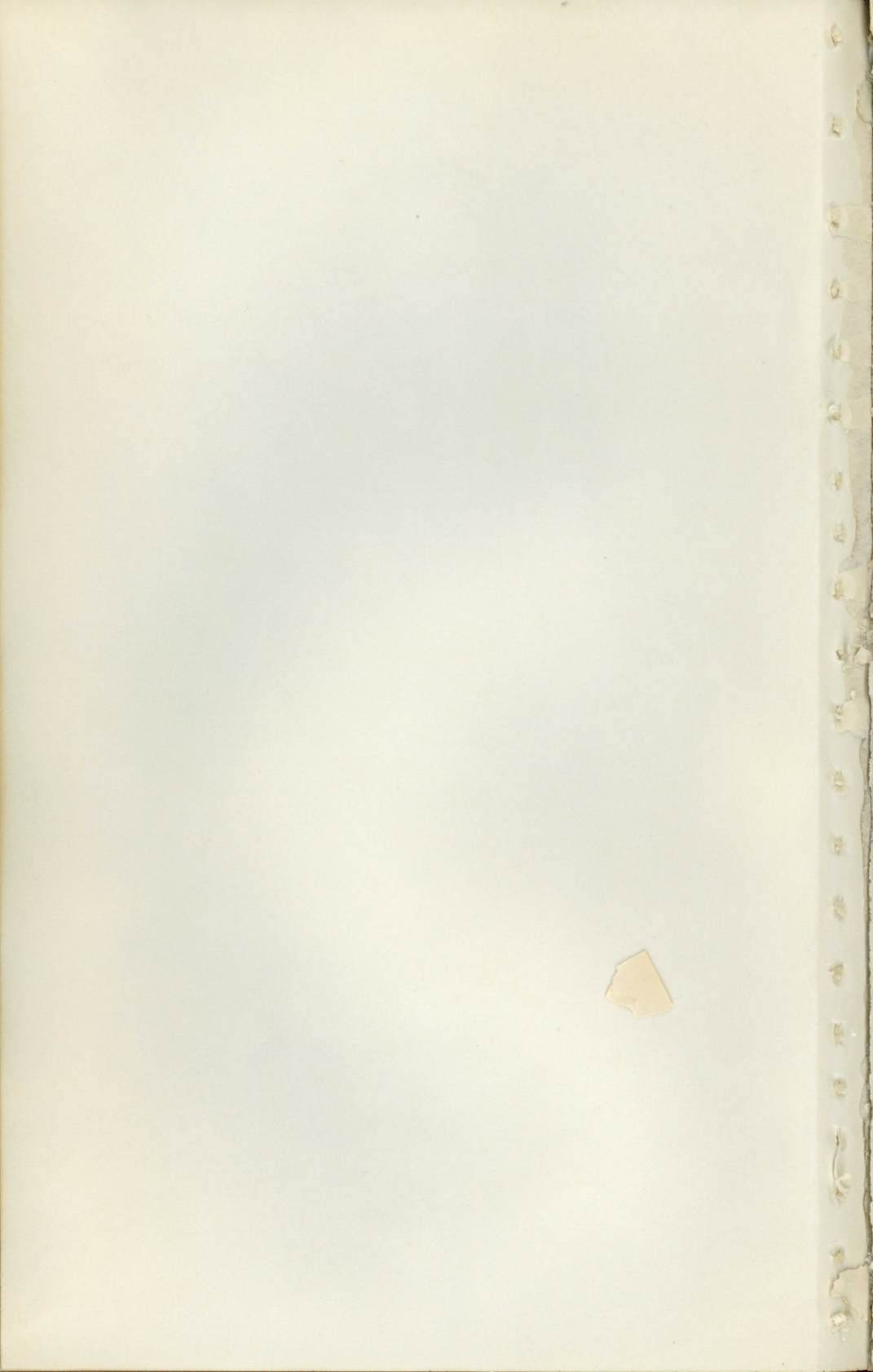
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UNITED STATES

By
CHARLES ALFRED ABELL



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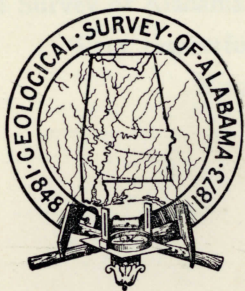
EUGENE ALLEN SMITH, *State Geologist*

BULLETIN No. 14

STATISTICS OF THE MINERAL PRODUCTION OF ALABAMA FOR 1912

COMPILED FROM MINERAL RESOURCES OF THE
UNITED STATES

By
CHARLES ARTHUR ABELE



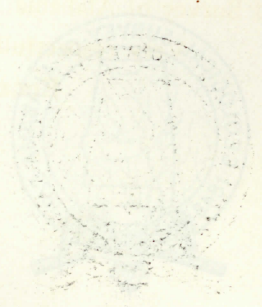
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1913

PROLOGICAL SURVEY OF ALABAMA
GENERAL FIELD SURVEY

STATISTICS OF THE MINING
INDUSTRY OF ALABAMA
FOR 1912

DEPARTMENT OF MINES
MONTGOMERY, ALABAMA

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LETTER OF TRANSMITTAL.

UNIVERSITY, ALA., November, 1913.

HON. EMMET O'NEAL,
Governor of Alabama,
Montgomery, Ala.

SIR:—I have the honor to transmit herewith the manuscript of a Report on the Mineral Production of Alabama for the year 1912, with the request that it be printed as Bulletin No. 14 of the Geological Survey of Alabama.

Very respectfully,

EUGENE A. SMITH,
State Geologist.

GEOLOGICAL CORPS.

Eugene Allen Smith, Ph. D.-----State Geologist
William F. Prouty, Ph. D.-----Chief Assistant
S. J. Lloyd, Ph. D.-----Assistant
Robert S. Hodges-----Chemist
Herbert H. Smith-----Curator of Museum
Roland M. Harper, Ph. D.-----Botanist
George N. Brewer-----Field Assistant
C. A. Abele-----In Charge of Mineral Statistics
A. T. Donoho-----Stenographer.

RIVER GAGE HEIGHT OBSERVERS.

C. J. Stowe-----Jackson's Gap, Tallapoosa River
J. E. Whitehead-----Riverside, Coosa River
S. T. Dillard-----Beck, Conecuh River
Ed. Bullin-----Red Bay, Big Bear Creek
E. Cummings-----Wedowee, Little Tallapoosa River

From the records of daily observations of the gage readings at these places when extended through sufficient time, the calculations of available horsepower to be obtained from the different streams is made.

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PREFACE.

The statistics of all the minerals included in the following pages have been collected in cooperation with the United States Geological Survey, and have been compiled by Mr. Abele from advance chapters of the *Mineral Resources of the United States*, a publication of the Federal Survey.

The introductory and general matter in each of these articles has either been taken without change from the U. S. advance chapters or has been rearranged or condensed from these chapters, or entirely rewritten to suit it for our present purposes. In each case credit is given to the author.

STATISTICS OF THE MINERAL PRODUCTION OF ALABAMA FOR 1912.

ABRASIVES.

EUGENE A. SMITH.

ALABAMA'S production of abrasives is at present limited to a small number of millstones; there are, however, several materials in different parts of the State which are sufficiently promising to be worth investigation and thorough testing; the nature and locality of these deposits were treated in Bulletin No. 13, which see.

BAUXITE.

THE production of bauxite in Alabama in 1912 was 14,173 long tons valued at \$60,254. This was an increase of 5,325 long tons, or 60.18 per cent over the production of 1911, and the increase in value amounted to \$24,862, or 70.25 per cent.

Below are presented in tabular form the foregoing figures:

Production of bauxite in Alabama in 1911 and 1912.

	Quantity (Tons)	Value	Percentage of Total U. S. Production.	Percentage of Total U. S. Value.
1911 -----	8,848	\$35,392	5.68	4.71
1912 -----	14,173	60,254	8.86	7.83
Increase -----	5,325	24,862	-----	-----
Per cent. -----	60.18	70.25	-----	-----

The following table gives the production and value of Bauxite from 1889 to 1912 inclusive:

Production of bauxite in the United States, 1889-1912, by States, in long tons.

Year	Georgia	Alabama	Arkansas	Total	Value
1889	728			728	\$2,366
1890	1,844			1,844	6,012
1891	3,301	292		3,593	11,675
1892	5,110	5,408		10,518	34,183
1893	2,415	6,764		9,179	29,507
1894	2,050	9,016		11,066	35,818
1895	3,756	13,313		17,069	44,000
1896	7,313	11,051		18,364	47,338
1897	7,507	13,083		20,590	57,652
1898				25,149	75,437
1899	15,736	14,499	5,045	35,280	125,598
1900	19,739		3,445	23,184	89,676
1901	18,038		867	18,905	79,914
1902	22,677		4,645	27,322	120,366
1903	22,374		25,713	48,087	171,306
1904	21,913		25,748	47,661	235,704
1905	15,173		32,956	48,129	240,292
1906	25,065		50,267	75,332	368,311
1907				*97,776	480,330
1908	14,464		*37,703	52,167	263,968
1909	22,227		*106,874	129,101	679,447
1910	33,096		*115,836	148,932	716,258
1911	30,170		*125,448	155,618	750,649
1912	19,587	14,173	*126,105	159,865	768,932

*Production of Tennessee included.

For an outline of the uses of bauxite, see Bulletin No. 13.

CEMENT

OWING to the fact that there was in Alabama in 1912 only one producer of puzzolan cement, and not more than two operating plants in the Portland cement industry, it is necessary to combine the productions of both industries in order to avoid publishing figures which were given the Survey in confidence. The tabular results of such a combination are, however, necessarily inconsistent and not to be taken too literally, since the weights per barrel of the two kinds of cement vary.

The total quantity of Portland and puzzolan cement produced in Alabama in 1912 was 726,688 barrels, valued at \$608,620, as compared with 593,911 barrels in 1911, valued at \$529,359, or an increase in production of 132,777 barrels, or 22.35 per cent, giving an increase in value of \$119,261, or 22.53 per cent. The percentages of increase in quantity and value are notably less than in 1911.

Below are presented in tabular form the foregoing figures:

*Production and value of cement (including puzzolan and Portland)
in Alabama in 1911 and 1912.*

	No. of Pro- ducers	Quantity (Bbls.)	Value	Value of Total U.S. Percentage
1911 -----	3	593,911	\$529,359	0.79
1912 -----	3	726,688	608,620	0.92
Increase -----		132,777	119,261	-----
Per cent. -----		22.35	22.53	-----

A review of the puzzolan cement industry in the United States for the past five years is given in the following table:

Statistics of the Puzzolan-Cement Industry, 1908-1912.

	1908	1909	1910	1911	1912
Number of plants reporting production:					
Alabama -----	1	1	1	1	1
Illinois -----					
Kentucky -----					
Maryland -----					
New Jersey -----					
New York* -----				1	1
Ohio -----	2	2	2	1	1
Pennsylvania -----	1	1	1	1	1
Total -----	4	4	4	4	4
Production in barrels of 330 pounds -----	151,451	160,646	95,951	93,230	91,864
Value of production -----	\$95,468	\$99,453	\$63,286	\$77,786	\$77,363

*Includes production of Collos cement in 1911 and 1912.

For a full account of the cement resources of Alabama, see Bulletins No. 8 and No. 13.

CLAY AND CLAY PRODUCTS.

JEFFERSON MIDDLETON AND C. A. ABELE.

CLAY.

CLAY available for the manufacture of clay products is one of the most widely spread of our minerals. Clay miners are usually also the manufacturers of the lower-grade clays, but as the higher grades of ware are reached, the rule is that fewer and fewer manufacturers are also miners, until in the highest grades of ware the rule is that the manufacturer is not the miner of the clays that he uses. The figures given in the following tables represent clay that is mined and not manufactured by the miner, but is sold as clay. The clay thus sold is small in quantity compared with that consumed and includes mainly clay used for refractory products.

The clay-mining industry showed a marked increase in Alabama in 1912, both in production and value. While the production was less than 60 per cent of that in 1910, the value was only 12 per cent less than in that year.

The total production of clay, which was later sold as such in 1912, was 43,052 short tons, valued at \$33,414. This was an increase in both quantity and value of 8,249 short tons, or 23.43 per cent, and \$3,505, or 11.72 per cent respectively. In 1912 clay other than fire-clay was again sold.

Below is a table giving the production and value of clay from 1908 to 1912, inclusive, and also a comparison of the years 1911 and 1912.

Production of clay from 1908 to 1912 inclusive, and a comparison of the production in 1911 and 1912.

	Fire-Clay		Miscellan. Clay		Total	
	Quantity Short Tons	Value	Quantity Short Tons	Value	Quantity Short Tons	Value
1908 -----	68,289	\$48,983	24,000	\$12,000	92,289	\$60,983
1909 -----	45,137	35,345	18,271	5,587	63,408	40,932
1910 -----	54,482	32,395	20,600	5,650	75,082	38,045
1911 -----	35,203	29,909	-----	-----	35,203	29,909
1912 -----	38,552	31,414	4,500	2,000	43,052	33,414
Increase -----	3,349	1,505	-----	-----	8,249	35,05
Per cent. -----	9.15	5.03	-----	-----	23.43	11.72

Quantity and value of clay mined in 1912.

Kind	Quantity Mined (Short Tons)	Value	Average Value Per Ton	Percentage of Total U. S. Value
Fire clay -----	38,552	\$31,414	\$0.81 +	1.33
Miscellaneous clay -----	4,500	2,000	0.44 +	0.76
Total -----	43,052	33,414	-----	0.89

CLAY-WORKING INDUSTRIES.

The total value of all clay products in Alabama in 1912 was \$1,935,179, a decrease of \$11,923, or 0.61 per cent, from 1911. The principal product is common brick, this item in 1912 being valued at \$759,409 and representing 39.24 per cent of the value of all of Alabama's clay products in that year. Vitrified, fire, and front brick combined represent a value approximating that of common brick alone, so that the output of the brickyards made up nearly 80 per cent of the State's total. Clays suitable for tile and pottery are available in the State, but these branches of the industry have not been extensively developed, the value of the pottery production being only \$22,213 in 1912.

Jefferson County is the principal clay-working county, reporting a production valued at \$1,135,339, or 58.67 per cent, of the value reported for the State. All of the fire brick produced in the State is reported from Jefferson County, though vitrified brick is the principal product. Only one other county in the State, St. Clair, produces vitrified brick. The leading counties in the manufacture of common brick are Jefferson, Montgomery and Russell.

Clay products of Alabama, 1908-1912

Product	1908	1909	1910	1911	1912
Brick:					
Common—					
Quantity -----	120,237,000	146,180,000	135,785,000	129,694,000	136,989,000
Value -----	\$690,963	\$799,693	\$746,961	\$708,903	\$759,409
Average per M.-----	\$5.75	\$5.47	\$5.50	\$5.47	\$5.54
Vitrified—					
Quantity -----	18,248,000	20,444,000	19,772,000	21,444,000	26,480,000
Value -----	\$244,084	\$262,376	\$236,516	\$246,707	\$353,303
Average per M.-----	\$13.38	\$12.83	\$11.96	\$11.50	\$13.34
Front—					
Quantity -----	(*)	(*)	(*)	9,169,000	10,629,000
Value -----	(*)	(*)	(*)	\$128,403	\$132,033
Average per M.-----	\$17.89	\$16.19	\$15.96	\$14.00	\$12.42
Fancy -----value.	(*)	(*)	(*)	(*)	(*)
Fire -----value.	\$122,354	\$196,887	\$163,672	\$193,375	\$240,434
Drain tile -----value.	\$2,046	(*)	\$3,773	\$3,777	\$5,465
Sewer pipe -----value.	(*)	(*)	(*)	(*)	(*)
Fireproofing -----value.	(*)	(*)	(*)	(*)	(*)
Pottery:					
Red earthenware value.	\$15,058	\$11,886	\$3,475	\$11,243	\$10,990
Stoneware and yellow a n d Rockingham ware -----value.	\$9,031	\$24,453	\$16,371	\$14,753	\$11,223
Miscellaneous -----value.	\$476,070	\$404,832	\$496,791	\$639,941	\$422,322
Total value----	\$1,559,606	\$1,700,127	\$1,667,559	\$1,947,102	\$1,935,179
Number of operating firms reporting -----	103	100	87	82	74
Rank of State -----	19	22	22	17	17

*Included in "Miscellaneous."

BRICK AND TILE.

The total common brick production in 1912 was 136,989 M, valued at \$759,409. This represented an increase in both quantity and value of 7,295 M, or 5.62 per cent, and \$50,506 or 7.13 per cent, respectively. The decrease in 1911 was over-

come in 1912, the 1912 production being 1,204 M more than in 1910, the resulting increase in value being \$12,448. All other types of brick and tile production, excepting that of miscellaneous brick, showed a marked increase over that of 1911; miscellaneous brick, which includes those types which are manufactured by less than three producers, showed a notable decrease in value in 1912, the decrease in this one class being sufficient to counteract the increase in value of all other classes and to lower the value of the 1912 production \$5,640 or 0.29 per cent.

The following tables give a review of the brick and tile industry in Alabama in 1911 and 1912.

Production of brick and tile in 1912

Kind	Quantity M.	Value	Av'g. Value per M.	Percentage of Total Value of Brick & Tile	Percentage of Total U. S. Value
Common Brick -----	136,989	\$759,409	\$5.54	39.69	1.46
Vitrified brick -----	26,480	353,303	13.34	18.46+	3.23
Front Brick -----	10,629	132,033	12.42	6.95	1.39
Fire Brick -----	9,930	240,434	24.21	12.55+	1.60
Drain Tile -----		5,465		0.28+	0.06
Miscellaneous -----		*422,322		22.06+	1.67
Total -----		\$1,912,966		100.00	1.40

*This value includes fancy brick, sewer pipe, fireproofing, and silica brick.

Production of brick and tile in 1911 and 1912.

Kind	1911			1912			Increase or Decrease in Value	Percentage
	Quantity	Value	Av'g. Price	Quantity	Value	Av'g. Price		
Common Brick ---	129,694	\$708,903	\$5.47	136,989	\$759,409	\$5.54	+\$50,506	+ 7.13
Vitrified Brick ---	21,444	246,707	11.50	26,480	353,303	13.34	+106,596	+43.22
Front Brick -----	9,169	128,403	14.00	10,629	132,033	12.42	+ 3,630	+ 2.82
Fire Brick -----	11,929	193,375	16.21	9,930	240,434	24.21	+ 47,059	+24.33
Drain Tile -----		3,777			5,465		+ 1,688	+44.69
Miscellaneous -----		637,441			*422,322		-215,119	-33.74
Total -----		1,918,606			1,912,966		- 5,640	- 0.29

*Includes Fancy Brick, Sewerpipe, Fireproofing and Silica Brick.

POTTERIES.

The pottery industry of Alabama is of relatively small importance, as only the commoner and coarser grades of ware are produced, and most of this for local trade only. Production was reported by 15 operators whose total output was valued in 1912 at \$22,213, which was a decrease of \$6,283 from 1911. The products consisted entirely of red earthenware and stoneware in nearly equal proportions.

The following tables give the values of pottery produced in 1911 and 1912, and also a comparison of the production and values in these years.

Value of pottery products in 1912.

Kind	Value	Percentage of Total Alabama Potteries	Percentage of Total U. S. Value
Red Earthenware -----	\$10,990	49.47 +	1.14
Stoneware and Rockingham ware-----	11,223	50.52 +	0.28 +
Total-----	22,213	100.00	0.62

Comparison of pottery products in 1911 and 1912.

Kind	1911	1912	Decrease	Percent- age
Red Earthenware -----	\$11,243	\$10,990	+ \$253	2.25
Stoneware and Rockingham ware---	17,253	11,223	6,030	34.95
Total-----	28,496	22,213	6,283	22.05

COAL.

E. W. PARKER.

TOTAL production in 1912, 16,100,600 short tons; spot value, \$20,829,252. The returns to the Survey for the calendar year 1912 show that the preliminary estimates of the production published early in the year were considerably in excess of the actual output. The preliminary estimates indicated that the production would exceed the record of 16,111,462 short tons made in 1910. The final results show that it fell about 10,000 tons short of that figure, and amounted to 16,100,600 short tons. This was an increase of 1,079,179 tons, or 7.18 per cent, over 1911, when it amounted to 15,021,421 tons. The value increased somewhat more in proportion—\$1,749,303, or 9.17 per cent—from \$19,079,949 in 1911 to \$20,829,252. The value of the 1912 production exceeded that of the slightly larger tonnage of 1910 by nearly \$600,000. The principal local increases in 1912 were in Walker County, 444,367 tons; Jefferson County, 398,459 tons; St. Clair County, 220,542 tons, and Bibb County, 148,138 tons. Two counties showed decreases, Tuscaloosa, 150,691 tons, and Etowah, 84,552 tons.

Rank of first ten coal-producing States in 1911 and 1912, with quantity and value of products and percentage of each.

1911.

Production			Value		
Rank	State or Territory	Quantity (short tons) Percentage of total product'n	Rank	State or Territory	Value Percentage of total value
1	Pennsylvania :		1	Pennsylvania :	
	Anthracite -----	90,464,067 18.2		Anthracite -----	\$175,189,392 28.0
	Bituminous -----	144,561,257 29.1		Bituminous -----	146,154,952 23.3
2	West Virginia -----	59,831,580 12.1	2	Illinois -----	59,519,478 9.5
3	Illinois -----	53,679,118 10.8	3	West Virginia -----	53,670,515 8.6
4	Ohio -----	30,759,986 6.2	4	Ohio -----	31,810,123 5.1
5	Alabama -----	15,021,421 3.0	5	Alabama -----	19,079,949 3.0
6	Indiana -----	14,201,355 2.9	6	Indiana -----	15,326,808 2.4
7	Kentucky -----	14,049,703 2.8	7	Colorado -----	14,747,764 2.4
8	Colorado -----	10,157,383 2.1	8	Kentucky -----	14,008,458 2.3
9	Iowa -----	7,331,648 1.5	9	Iowa -----	12,663,507 2.0
10	Virginia -----	6,864,667 1.4	10	Wyoming -----	10,508,863 1.7

1912.

Production			Value		
Rank	State or Territory	Quantity (short tons) Percentage of total product'n	Rank	State or Territory	Value Percentage of total value
1	Pennsylvania :		1	Pennsylvania :	
	Anthracite -----	84,361,598 15.8		Anthracite -----	\$177,622,626 25.6
	Bituminous -----	161,865,488 30.3		Bituminous -----	169,370,497 24.4
2	West Virginia -----	66,786,687 12.5	2	Illinois -----	70,294,338 10.1
3	Illinois -----	59,885,226 11.2	3	West Virginia -----	62,792,234 9.0
4	Ohio -----	34,528,727 6.4	4	Ohio -----	37,083,363 5.3
5	Kentucky -----	16,490,521 3.1	5	Alabama -----	20,829,252 3.0
6	Alabama -----	16,100,600 3.0	6	Indiana -----	17,480,546 2.5
7	Indiana -----	15,285,718 2.8	7	Kentucky -----	16,854,207 2.4
8	Colorado -----	10,977,824 2.0	8	Colorado -----	16,345,336 2.4
9	Virginia -----	7,846,638 1.5	9	Iowa -----	13,152,088 1.9
10	Wyoming -----	7,368,124 1.4	10	Wyoming -----	11,648,088 1.7

The statistics of the production of coal in Alabama in 1911 and 1912, with the distribution of the product for consumption, are shown in the following table:

Coal production of Alabama in 1911 and 1912, by counties, in short tons.

1911.

County	Loaded at mines for shipment	Sold to local trade and used by employees	Used at mines for steam and heat	Made into coke	Total quantity	Total value	Average price per ton	Average number of days active	Average number of employees
Bibb -----	1,515,976	9,592	107,629	-----	1,633,197	\$2,407,918	\$1.47	239	2,631
Blount -----	80,266	1,900	100	-----	82,266	98,599	1.20	225	189
Etowah -----	252,866	720	2,274	-----	255,860	360,307	1.40	189	492
Jefferson -----	4,804,221	86,017	307,265	2,578,887	7,776,390	9,668,726	1.24	246	10,665
St. Clair -----	509,120	1,584	18,507	-----	529,211	673,576	1.27	240	682
Shelby -----	430,505	2,723	29,861	-----	463,089	757,772	1.64	240	866
Tuscaloosa -----	585,666	9,310	61,624	375,058	1,031,658	1,288,235	1.25	265	1,445
Walker -----	2,820,521	25,077	82,610	175,387	3,103,595	3,598,720	1.16	180	5,360
Winston -----	16,074	350	-----	-----	16,424	25,185	1.50	67	129
Other counties* & small mines	120,348	3,918	5,465	-----	129,731	200,911	1.55	170	248
Total-----	11,135,563	141,191	615,335	3,129,332	15,021,421	19,079,949	1.27	227	22,707

1912.

Bibb -----	1,622,198	9,823	109,314	-----	1,781,335	\$2,621,682	\$1.47	272	2,948
Blount -----	143,603	1,139	1,600	-----	146,342	181,036	1.24	211	282
Etowah -----	166,366	3,067	1,875	-----	171,308	249,749	1.46	265	260
Jefferson -----	6,168,715	81,368	339,211	1,585,555	8,174,849	10,433,728	1.28	251	10,922
St. Clair -----	722,276	2,456	25,021	-----	749,753	959,219	1.28	291	725
Shelby -----	463,788	3,501	29,660	-----	496,949	872,501	1.76	250	878
Tuscaloosa -----	631,114	12,038	48,863	188,952	880,967	1,091,882	1.24	239	1,220
Walker -----	3,271,284	32,030	102,681	141,967	3,547,962	4,158,094	1.17	211	5,079
Winston -----	18,550	105	75	-----	18,730	27,793	1.48	220	57
Other counties† & small mines	124,627	2,059	5,719	-----	132,405	233,568	1.76	229	242
Total-----	13,372,521	147,586	664,019	1,916,474	16,100,600	20,829,252	1.29	245	22,613

Cullman, DeKalb, Jackson, and Marion. †Cullman, Jackson, and Marion.

In the following table is presented a statement of the production of coal in Alabama, by counties, during the last five years, with increase and decrease in 1912 as compared with 1911:

Coal production of Alabama, 1908-1912, by counties, in short tons.

County	1908	1909	1910	1911	1912	Increase (+) or decrease (—), 1912.
Bibb -----	1,166,548	1,338,243	1,580,564	1,633,197	1,781,335	+ 148,138
Blount -----	*181,062	*186,261	*235,456	*210,070	*276,429	+ 66,359
Cullman -----						
Etowah -----	8,880	46,194	172,465	255,860	171,308	— 84,552
Jefferson -----	5,914,129	7,176,922	8,298,702	7,776,390	8,174,849	+ 398,459
St. Clair -----	193,434	354,005	428,409	529,211	749,753	+ 220,542
Shelby -----	407,547	524,925	488,141	463,089	496,949	+ 33,860
Tuscaloosa -----	712,101	1,006,989	1,081,219	1,031,658	880,967	— 150,691
Walker -----	2,941,836	2,973,776	3,788,479	3,103,595	3,547,962	+ 444,367
Winston -----	28,408	32,278	16,442	16,424	18,730	+ 2,306
Other counties and small mines ----	50,648	63,857	21,585	1,927	2,318	+ 391
Total -----	11,604,593	13,703,450	16,111,462	15,021,421	16,100,600	+ 1,079,179
Total value -----	\$14,647,891	\$16,306,236	\$20,236,853	\$19,079,949	\$20,829,252	+ \$1,749,303

The great Appalachian coal region which furnishes over two-thirds of the coal production of the United States and which extends from Ohio and Pennsylvania on the north in a gradually narrowing belt through eastern Kentucky and Tennessee has its southern terminus in a considerably broadened area that occupies a large part of the northern half of Alabama. The coal-bearing formations of Alabama underlie about 8,400 square miles and are divided into four distinct basins, the Coosa, the Cahaba, and the Warrior, named from the rivers which drain them, and the Plateau, which includes Blount, Lookout, and Sand or Raccoon Mountains. By far the most important basin in area and in production is the Warrior, which includes all of Walker County, most of Jefferson, Tuscaloosa, and Fayette counties, and smaller parts of Blount, Cullman, Winston, and Marion counties. The area known to contain coal is approximately 4,000 square miles, or one-half the total coal area of the State, and contributes about 80 per cent of the total production.

There are several distinct coal groups in the basin, the most important of which are the Brookwood, the Pratt, and the Mary Lee, designated by the names of their principal beds. The Mary Lee group includes the Blue Creek, the Jagger, and the

Newcastle beds, most of which are mined in places. The Brookwood, the Pratt, and the Mary Lee produce most of the coking coal mined in the State, and more than half of all of the coal mined in the district.

The Cahaba Basin, second in importance, is a long narrow syncline, 68 miles long and about 6 miles wide, southeast of the Warrior, and occupies parts of St. Clair, Jefferson, Shelby, and Bibb counties. There are many workable beds and the total quantity of coal in the basin is large. The production is something over 10 per cent of the total for the State.

The Coosa Basin is a deep syncline east of the Cahaba and parallel with it, extending across Shelby and St. Clair counties. It is also long and narrow, 60 miles long by 6 miles wide. It has not been thoroughly explored, but in different parts of the area from two to twelve beds, 3 or more feet in thickness, have been reported.

The Plateau field embraces parts of Blount, Etowah, Dekalb, Cherokee, Marshall, and Jackson counties, and although it has an area underlain by coal four times that of the Cahaba and the Coosa combined, the resources in Alabama are comparatively small. There are four to six beds locally workable.

For maps of the Alabama coal fields, apply to the State Geologist, University of Alabama.

So far as known, the earliest record of the existence of coal in Alabama was made in 1834. The first statement of production in the State is contained in the United States census report for 1840, in which year the production is given as 946 tons. The census report for 1850 does not mention any coal production for the State, and the next authentic record is contained in the census statistics of 1860, when Alabama is credited with an output of 10,200 short tons. The mines of Alabama were probably worked to a considerable extent during the Civil War, but there are no records of the actual production until 1870, for which year the United States census reports a production of 11,000 tons. Ten years later the production had increased to 323,972 short tons, but the development of the present great industry really began in 1881 and 1882, when attention was directed to the large iron deposits near the city of Birmingham, and thus the great "boom" of that city and vicinity was inaugurated. By 1885 the coal pro-

duction of the State had increased to nearly 2,500,000 tons. Then followed a period of relapse and liquidation, which lasted two years, after which business settled down to a conservative and rational basis and has since developed steadily. In 1902 the coal production of the State reached a total of more than 10,000,000 tons, and reached the maximum of 16,111,462 tons in 1910.

The statistics of production in Alabama from 1840 to the close of 1912 are shown in the following table:

Production of coal in Alabama from 1840 to 1912, in short tons.

Year	Quantity	Year	Quantity	Year	Quantity	Year	Quantity
1840----	946	1859----	9,000	1878----	224,000	1897----	5,893,770
1841----	1,000	1860----	10,200	1879----	280,600	1898----	6,535,283
1842----	1,000	1861----	10,000	1880----	323,972	1899----	7,593,416
1843----	1,200	1862----	12,500	1881----	420,000	1900----	8,394,275
1844----	1,200	1863----	15,000	1882----	896,000	1901----	9,099,052
1845----	1,500	1864----	15,000	1883----	1,568,000	1902----	10,354,570
1846----	1,500	1865----	12,000	1884----	2,240,000	1903----	11,654,324
1847----	2,000	1866----	12,000	1885----	2,492,000	1904----	11,262,046
1848----	2,000	1867----	10,000	1886----	1,800,000	1905----	11,866,069
1849----	2,500	1868----	10,000	1887----	1,950,000	1906----	13,107,963
1850----	2,500	1869----	10,000	1888----	2,900,000	1907----	14,250,454
1851----	3,000	1870----	11,000	1889----	3,572,983	1908----	11,604,593
1852----	3,000	1871----	15,000	1890----	4,090,409	1909----	13,703,459
1853----	4,000	1872----	16,800	1891----	4,759,781	1910----	16,111,462
1854----	4,500	1873----	44,800	1892----	5,529,312	1911----	15,021,421
1855----	6,000	1874----	50,400	1893----	5,136,935	1912----	16,100,600
1856----	6,800	1875----	67,200	1894----	4,397,178		
1857----	8,000	1876----	112,000	1895----	5,693,775	Total..	237,275,836
1858----	8,500	1877----	196,000	1896----	5,748,697		

The evolution in making coke in the United States and the gradual shifting of this related industry from the coal-mining region to the centers of population and manufacture is interestingly shown in the statistics of coal production of Alabama. According to the returns the quantity of coal made into coke decreased from 4,417,443 tons in 1910 to 3,129,332 tons in 1911, and to 1,916,474 tons in 1912, whereas the actual quantities of coal made into coke in the State were 5,272,322 tons in 1910, 4,411,298 tons in 1911, and 4,585,498 tons in 1912. The reason for this apparent discrepancy lies in the fact

that in the two later years the proportion of coal made into coke in by-product ovens has materially increased and as these ovens are located at the blast furnaces, or in or near the larger cities, the coal shipped to them appears as a part of the product "loaded at mines for shipment" and not as coal made into coke at the mines. The quantity of Alabama coal made into coke in 1912 at points distant from the mines was nearly one and a half times that used at ovens near the mines.

Coal mining in Alabama in 1912 gave employment to 22,613 men for an average of 245 days, against 22,707 men for 227 days in 1911, the larger production in 1912 being accomplished through the additional working time. The average production per man in 1912 was 712 tons against 662 in 1911, but the average daily production per man was lower in 1912, 2.91 tons against 2.92 tons in 1911. Most of the mines in Alabama are operated 10 hours a day.

Average production per man compared with hours worked per day, and average number of days worked 1910-1912.

Year	8 hours		9 hours		10 hour		All others	Total	Days Worked	Average Tonnage	
	Mines	Men	Mines	Men	Mines	Men	Men	Men		Per Year	Per Day
1910-----	18	766	36	2,633	134	17,306	1,525	22,230	249	725	2.91
1911-----	15	550	50	5,345	102	12,628	4,184	22,707	227	662	2.92
1912-----	11	338	46	4,145	107	13,938	4,192	22,613	245	712	2.91

The production by machines increased from 2,936,512 tons in 1911 to 3,742,549 tons in 1912, and the percentage of machine-mined coal to the total increased from 19.6 to 23.2. There were 353 machines in use in 1912, an increase of 81 over 1911 and of 36 over 1910. Several mines equipped with machines were either idle or did not use their full equipment in 1911. Of the 353 machines in 1912, 222 were punchers, 60 were chain breast, 12 were long wall, and 59 short wall.

Number and kind of machines in use, and average production per man compared with production by machines, by short tons, in 1911 and 1912.

Year	Pick	Chain Breast	Long-Wall	Short-Wall	Total	Average Tonnage		Production by Machines	
						Per year	Per day	Total Tonnage by Machines	% of Machined Coal to State Total
1911 -----	184	53	13	22	272	662	2.92	2,936,512	19.55
1912 -----	222	60	12	59	353	712	2.91	3,742,549	23.2
Increase or decrease	+ 38	+ 7	- 1	+ 37	+ 81	+ 50	-.01	+ 806,037	----
Per cent -----	20.65	13.20	9.23	168.18	29.77	7.57	-----	20.64	----

Of the Alabama production not mined by machines 5,658,457 tons, or 35.1 per cent of the total, were shot off the solid, and 6,658,732 tons, or 41.4 per cent, were mined by hand.

Quantity and percentage of bituminous coal produced by different methods in 1911 and 1912.

Year	Mined by Hand	Percentage	Shot off the Solid	Percentage	Mined by Machines	Percentage	Not reported	Percentage	Total Production
1911 -----	4,673,719	36.1	6,623,252	44.1	2,936,512	19.6	787,938	5.2	15,021,421
1912 -----	6,658,732	41.4	5,658,457	35.1	3,742,549	23.2	40,862	0.3	16,100,600
Increase or decrease	+1,985,013	---	-964,795	---	+806,037	---	-747,112	---	+1,079,179
Percentage	+ 42.49	---	- 14.56	---	+ 27.44	---	- 94.81	---	+ 7.18

There were 7,187,211 tons of coal washed in 1912, yielding 6,325,946 tons of cleaned coal and 861,265 tons of refuse. A large part of the washed coal is used for making coke.

*Quantity and percentage of coal washed, by short tons, in 1911
and 1912.*

	Quantity of Coal Washed	Percentage of Coal Mined	Quantity of Clean Coal	Refuse	
				Quantity	% of Total Coal Washed
1911 -----	6,251,828	41.61	5,538,401	713,427	11.41
1912 -----	7,187,211	44.64	6,325,946	861,256	11.98
Increase -----	935,383	-----	787,545	147,829	-----
Percentage -----	14.96	-----	14.22	20.72	-----

According to the United States Bureau of Mines there were 121 fatal accidents in the coal mines of Alabama in 1912, a decided improvement over 1911, when, because, of several explosions and frequent deaths from windy shots, the aggregate number of fatalities was 209. Of the 121 deaths in 1912, 110 occurred underground, 61 of them due to falls of roof and coal, 25 to explosions of gas and dust, 11 to mine cars and locomotives, 9 to electrical shocks and burns, and 3 to explosives, including premature blasts, etc. Four deaths occurred in shafts and 7 on the surface.

There were no strikes of serious consequence during the year, the record showing 384 men idle for an average of 32 days.

Statistics of labor troubles 1910-1912.

Year	Number of Men in Strike	Percentage of Total Men Working	Total Days Lost	Average Number of Days Lost Per Man
1910 -----	25	0.11	1,250	50
1911 -----	210	0.92	1,260	6
1912 -----	384	1.69	12,323	32

COKE.

E. W. PARKER.

ALABAMA'S output of coke in 1912 amounted to 2,975,489 short tons valued at \$8,098,412, against 2,761,521 short tons, valued at \$7,593,594, in 1911, the increase in 1912 being 213,968 tons, or 7.75 per cent, in quantity and \$504,818, or 6.65 per cent, in value. Alabama retained in 1912 second place in the rank of coke-producing States, it having superseded West Virginia in 1911.

Rank of the first five states in the production of coke, 1907-1912.

State	1907	1908	1909	1910	1911	1912
Pennsylvania -----	1	1	1	1	1	1
Alabama -----	3	3	3	3	2	2
Indiana -----	—	—	—	—	—	3
West Virginia -----	2	2	2	2	3	4
Illinois -----	10	9	5	4	4	5

Comparison of the production and value of coke in Alabama in 1911 and 1912.

	No. of Ovens	Coal Charged (Short Tons)	Coke Produced (Short Tons)	Total Value of Coke Ovens	Percent of Total U. S. Value
1911 -----	10,121	4,411,298	2,761,521	\$7,593,594	9.02
1912 -----	10,208	4,585,498	2,975,489	8,098,412	7.24
Increase -----	87	174,200	213,968	504,818	-----
Percentage -----	0.86	3.95	7.75	6.65	-----

The average price per ton for Alabama coke has declined from \$2.82 in 1910 to \$2.75 in 1911, and to \$2.72 in 1912. This does not necessarily indicate an actual decline in the price of

coke. A large proportion, possibly over 90 per cent, of Alabama coke is consumed in furnaces which are owned by the same interests owning and operating the coal mines and coke ovens, and the placing of a value on the coke is largely a matter of accounting. The lower value per ton of the coke produced in 1912 was in spite of the fact that the value of the coal used advanced from \$1.28 in 1911 to \$1.35 in 1912.

That Alabama has developed her coking industry along the lines of modern practice is evinced by the fact that in each of the last three years the only new ovens under construction on December 31 were retort ovens. During 1912 there were 195 beehive ovens abandoned and 2 were rebuilt, a net loss in this type of ovens of 193. The number of retort ovens on the other hand, increased from 340 in 1911 to 620 in 1912, and there were 100 additional retort ovens under construction at the end of the year. **The present installations of retort ovens** in Alabama are 280 Semet-Solvay ovens and 340 Koppers ovens. The former include 240 Semet-Solvay ovens at Ensley (one-half completed in 1898 and the other half in 1902) and 40 at Tuscaloosa, which were completed in 1906. The 340 Koppers ovens include 60 completed during 1911 by the Woodward Iron Co., at Woodward, and 280 completed in 1912 by the Tennessee Coal, Iron & Railroad Co., at Corey. The 100 new ovens under construction at the end of the year consisted of 80 Koppers ovens building at Woodward and 20 Semet-Solvay ovens building at Tuscaloosa. There were 46 establishments in Alabama in 1912, an increase of 2 over 1911, but although 280 retort ovens were added during 1912 the total number of ovens increased only 87, or from 10,121 to 10,208, indicating that there was a decrease of 193 in the number of beehive ovens. Of the 46 establishments in Alabama, 18, with a total of 2,902 ovens, were idle. In addition to these there were 597 ovens, portions of other establishments, that were idle during the year. The number of active ovens was 6,709 and the average production per oven was 444 tons, against 337 tons per oven in 1911 and 338 tons in 1910, these figures again showing the influence of the operations of retort ovens on Alabama's production.

The production of coke in Alabama in 1880, 1890, 1900, and from 1908 to 1912 is shown in the following table:

Statistics of the manufacture of coke in Alabama, 1880-1912.

Year	Establishments	Ovens		Coal Used (Short Tons)	Yield of Coal in Coke (per cent)	Coke Produced (Short Tons)	Total Value of Coke at Ovens	Value of Coke at Ovens Per Ton
		Built	Building					
1880-----	4	316	100	106,283	57.0	60,781	\$183,063	\$3.01
1890-----	20	4,805	371	1,809,964	59.0	1,072,942	2,589,447	2.41
1900-----	30	6,529	690	3,582,547	58.9	2,110,837	5,629,423	2.67
1908-----	45	10,103	0	3,875,791	61.0	2,362,666	7,169,901	3.04
1909-----	43	10,061	0	5,080,764	60.7	3,085,824	8,068,267	2.61
1910-----	43	10,132	340	5,272,322	61.6	3,249,027	9,165,821	2.82
1911-----	44	10,121	280	4,411,298	62.6	2,761,521	7,593,594	2.75
1912-----	46	*10,208	†100	4,585,498	64.9	2,975,489	8,098,412	2.72

*Includes 280 Semet-Solvay and 340 Koppers ovens.

†80 Koppers and 20 Semet-Solvay ovens.

Most of the coal used in the manufacture of coke in Alabama is washed before being charged into the oven. In 1912, out of a total of 4,585,498 tons, 3,819,400 tons, or 83 per cent, were washed. Of the washed coal used 2,922,979 tons were slack and 896,421 tons were run of mine. The unwashed coal was principally mine run, there being 747,305 tons of unwashed run-of-mine coal used and 18,793 tons of unwashed slack.

The character of the coal used in the manufacture of coke in Alabama in 1890, 1900, and for the last five years, is shown in the following table:

Character of coal used in the manufacture of coke in Alabama, 1890-1912, in short tons.

Year	Run of Mine		Slack		Total
	Unwashed	Washed	Unwashed	Washed	
1890-----	1,480,669	0	206,106	123,189	1,809,964
1900-----	1,729,882	152,077	165,418	1,535,170	3,582,547
1908-----	548,093	1,457,360	53,218	1,817,120	3,875,791
1909-----	713,992	2,153,081	0	2,212,971	5,080,764
1910-----	771,931	1,308,085	0	3,192,306	5,272,322
1911-----	693,135	1,295,109	2,937	2,420,117	4,411,298
1912-----	747,305	896,421	18,793	2,922,979	4,585,498

GOLD AND SILVER.

H. D. M'CASKEY.

THE mine production of gold in Alabama in 1912 was 809.02 fine ounces, valued at \$16,724, and of silver, 168 fine ounces, valued at \$103, against 915.06 fine ounces of gold, valued at \$18,916, and 171 fine ounces of Silver, valued at \$91, in 1911. The gold output was all from gold-quartz mines in 1912 and the silver production was entirely from refining the gold bullion produced. No copper, lead, or zinc output was reported from Alabama in either 1912 or 1911.

The following table shows the mine production of gold and silver in Alabama since 1905, when the United States Geological Survey first collected detailed figures from the mines of the Eastern States:

Production of gold and silver in Alabama from 1905 to 1912 inclusive.

	Ore Sold or Treated (Short Tons)	Gold		Silver		Total Value
		Quantity oz.	Value	Quantity oz.	Value	
1905	16,425	2,009.0	\$41,530	336	203	\$41,733
1906	8,565	1,137.0	24,921	124	83	25,004
1907	18,400	1,256.9	25,982	439	290	26,272
1908	11,174	1,993.4	41,208	282	149	41,357
1909	9,886	1,414.4	29,239	212	110	29,349
1910	9,763	1,662.2	33,533	268	145	33,678
1911	6,360	915.0	18,916	171	91	19,007
1912	5,693	809.0	16,724	168	103	16,827
Increase or decrease in 1912	667	106.0	2,192	3	12	2,180
Percentage	-10.48	-11.58	-11.60	-1.75	+13.18	-11.47

The production for 1912 was from 5,693 short tons of siliceous ore with an average recoverable precious metal value of \$2.96 per ton, against 6,360 tons and a recovery of \$2.99 in 1911 and 9,763 tons and a recovery of \$3.41 in 1910.

In Clay County, near Pyriton, are several pyrite mines, all idle in 1912, whose ores were formerly sold for their sulphur content and produced residues containing gold, silver, and copper. No operations were reported from the Gold Ridge properties in Cleburne and Randolph counties, although the last-named prospects were leased and may be operated in 1913. The equipment includes a 20-stamp mill and an 80-ton cyanide plant. At the Storey prospect in Talladega County a small tonnage was again treated during operations of about two months of the 5-stamp amalgamation mill. The Tallapoosa mine, of Tallapoosa County, was also operated a short time in 1912, and produced gold on a small scale. The output was again chiefly from the Hog Mountain, or Hillabee, mines in Tallapoosa County, operated in 1912 under lease. The ores treated in 1912 were oxidized, and were all cyanided in the 75-ton plant of the company.

GRAPHITE.

E. S. BASTIN.

THE plant of the Quenelda Graphite Co. (formerly the Allen Graphite Co.), at Quenelda, was destroyed by fire but is now being rebuilt with a capacity for handling 400 tons of crude material in 10 hours. No production was reported for 1912.

The Ashland Graphite Co.'s plant, about 4½ miles west of Ashland, was idle during 1912. Some of the persons interested in this company are engaged, under the name of the Alabama Graphite Co., in developing a graphite deposit of similar character in the near vicinity. A mill was erected and began operations in August, 1912.

Production and value of graphite in 1911 and 1912.

	Quantity Lbs.	Value	Percentage of Total U. S. Quantity	Percentage of Total U. S. Value
1911 -----	820,000	\$39,000	1.40	13.51
1912 -----	534,100	21,364	-----	-----
Decrease -----	285,900	17,636	-----	-----
Percentage -----	34.86	45.20	-----	-----

In addition to the production above given, the Alabama Graphite Company produced in 1912, 144,062 pounds, at the plant of the Ashland Graphite Company purchased by them. The total production for 1912 is, therefore, 678,162 pounds.

For a full account of the graphite deposits and workings of Clay, Chilton, and Coosa counties, see Bulletin No. 13.

IRON ORE.

EUGENE A. SMITH.

IRON ores of Alabama in the order of their economic importance are (1) red ore or hematite; (2) the brown ore or limonite; (3) the gray ore. The black band and clay iron stone have been noticed as occurring in a number of places, but only the red ore and the brown ore have been mined on any large scale.

Practically all the ore mined in Alabama is smelted in the State, the shipments out of the State being about equal to those received from other states.

The tables given below will show the rank of Alabama among the States of the Union both in the production of iron ore and in pig iron, and will show also the quantity of iron produced by charcoal and by coke respectively as fuel.

RED ORE OR HEMATITE.

Practically all the ore of this quality mined in Alabama occurs in the Clinton or Red Mountain formation. The Red Mountain ridges occur on each side of the anticlinal valleys which separate the coal fields. In places the red ore ridges are lacking on one side, usually the western, of the valleys being cut out by faults, while on the other hand the ridge may be duplicated on one side of the valley by the same faults.

In most of the valley occurrences the moderate dips of the ore bed are on the eastern side and there are also practically all of the ore mines. Murphrees Valley makes an exception to this, the moderate dips and the iron mines being on the western side. The iron ore occurs mainly in the central part of the formation in seams or beds one to five in number, which vary in thickness from a few inches to thirty feet.

While the ore seams are very persistent along the outcrop which in Alabama must be as much as 50 miles, yet they vary greatly from place to place, being either too thin or too lean for profitable working in the greater part of this distance.

The most important development of the Clinton ore in this State and in the world is along the 15 or 16 miles stretch of the east Red Mountain between Birmingham and Bessemer, and there is a practically continuous series of mines and stripings for this entire distance. Much mining of this ore has also been done near Gate City, Village Springs, Attalla, Gadsden, Round Mountain, Gaylesville, Ft. Payne, Valley Head, etc.

The completion in October, 1912, of a diamond drill boring in Shades Valley, within a mile of the base of Shades Mountain, gives a definite answer to the speculations concerning the occurrence of red ore under Shades Valley. This boring shows that there is no falling off in the thickness and quality of the ore with distance from the outcrop, and that the depth of the ore below the surface at a distance of more than $2\frac{1}{2}$ miles from the outcrop on Red Mountain is not too great for shaft mining.

The elevation of the surface at the drilling is 595 feet. The top of the ore was reached at a depth of 1,902 feet and a section of the seam in descending order is:

Ore (Self-fluxing)	9 ft. 6 in.
Shale	4 in.
Ore (Siliceous)	9 ft. 6 in.

An analysis of an average sample of the drill of the core of the upper bench, made by David Hancock, shows as follows:

	Per Cent.
Metallic iron	39.51
Silica	9.94
Alumina	3.34
Calcium Carbonate	24.20
Magnesium carbonate	.78
Metallic manganese	.20
Phosphorus	.32

The importance of this demonstration of a vast increase in the amount of red ore available immediately or in the near future, cannot well be overestimated.

Production and value of hematite in Alabama in 1911 and 1912.

	Quantity (Tons)	% of Total U. S. Prod.	Value	% of Total U. S. Value
1911 -----	3,119,696	8.43	\$3,646,925	4.65
1912 -----	3,814,361	7.42	4,638,734	4.8
Increase -----	694,665	---	991,809	---
Percentage -----	22.26	---	27.19	---

The average price per long ton of hematite in Alabama in 1911 was \$1.17; in 1912, \$1.16.

BROWN ORE OR LIMONITE.

This ore, the second in importance in the State and in the United States, furnished only 2.92 per cent of the total iron ore production of the United States in 1912. Of this Alabama produced 46.40 per cent, 749,242 long tons, and the State holds the *first* rank in this industry.

In the early days of iron making and up to the year 1876 this was the only ore used in the catalan forges, bloomaries, and charcoal furnaces of the State. It was then demonstrated that good iron could be made at low cost from the red ores, with coke for the fuel.

In general the limonites are considered the best of the ores of Alabama and they command the highest prices and command a ready sale.

The usual mode of occurrence is in irregular masses of concretionary origin in the residual clays resulting from the decomposition of limestones, and as a consequence the mining is uncertain and expensive. Limonite also occurs in regularly stratified seams or beds, and then it is the result of the alteration of pyrites or of carbonate ores. Practically all of the brown ore actually mined is that occurring in the residual clays above mentioned. Most of the ore before going to the furnace is washed and screened, and this manipulation, together with the cost of mining, makes it the most expensive of the iron ores, and it is therefore seldom used alone, but is usually mixed with the red ore in proportions determined by the quality of the iron desired. It is used alone in the charcoal furnaces and also in the coke furnaces when a particularly tough pig iron is wanted.

The limonite deposits are very numerous and are distributed over a broad expanse of country and in many places are known to be very extensive. In some of the deposits the ore is in nearly solid mass, in others it is much scattered, and in consequence the amount of foreign material necessary to be moved for every ton of ore produced, varies very much, not only in the different ore banks but also in the different parts of the same bank.

The deposits occur in nearly all the geological formations of the state, but in most of these the ore is either insufficient in quantity or not pure enough to be of much commercial value. The most important of the deposits, in point of extent and value, occur overlying the following formations, viz., the Knox Dolomite and the Weisner Quartzite, the Lauderdale Chert of the Lower Carboniferous, and the Lafayette. Some extensive beds of ore of inferior quality generally occur also in the Tuscaloosa formation of the Cretaceous, and in the upper part of the Lower Carboniferous and in the Metamorphic rocks.

The average price per long ton of limonite ore in Alabama in 1911 was \$1.47; in 1912, \$1.43.

Production and value of brown ore in Alabama in 1911 and 1912.

	Quantity (Tons)	% of Total U. S. Prod.	Value	% of Total U. S. Value
1911 -----	835,886	43.96	\$1,229,181	39.13
1912 -----	749,242	46.40	1,095,637	37.91
Decrease -----	86,644	----	133,544	----
Percentage -----	10.36	----	10.86	----

Production of iron ore in Alabama in 1911 and 1912.

	Hematite (Long Tons)	Brown Ore (Long Tons)	Total Quantity	Value	% of Total U. S. Value
1911 -----	3,119,696	835,886	3,955,582	\$4,876,106	5.64
1912 -----	3,814,361	749,242	4,776,545	5,734,371	5.36
Increase or decrease -----	+ 694,665	- 86,644	+ 820,963	+ 858,265	----
Percentage -----	+ 22.26	- 10.36	+ 20.75	+ 17.60	----

In the following table the first five States in the production of iron ore are arranged according to their rank as producers in 1911 and 1912, with regard to both the quantity and the value of the ore produced:

Rank of iron-ore producing States in 1911 and 1912, with quantity and value of product and percentage of each.

1911.							
State	Mined		Marketed				
	Quantity		Quantity		Value		
	Quantity (Long Tons)	Percentage of Total Produc'n	Quantity (Long Tons)	Percentage of Total Produc'n	Amount	Percentage of Total Value	
1 Minnesota -----	24,645,105	56.17	23,398,406	56.94	\$48,447,760	55.87	
2 Michigan -----	10,329,039	23.54	8,945,103	21.77	23,810,710	27.46	
3 Alabama -----	3,827,791	8.72	3,955,582	9.63	4,876,106	5.62	
4 New York -----	1,061,279	2.42	1,057,984	2.58	2,959,009	3.41	
5 Wisconsin -----	698,660	1.59	610,871	1.49	1,146,188	1.32	

1912.							
1 Minnesota -----	34,431,768	62.43	34,249,813	60.07	\$61,805,017	57.74	
2 Michigan -----	11,191,430	20.29	12,797,468	22.44	29,003,163	27.09	
3 Alabama -----	4,563,603	8.28	4,766,545	8.38	5,734,371	5.36	
4 New York -----	1,216,672	2.21	1,167,405	2.05	2,933,024	2.74	
5 Wisconsin -----	860,600	1.56	1,152,250	2.02	2,731,574	2.55	

Iron-ore mines of the United States that produced more than 50,000 long tons each in 1912.

	Name of Mine	Nearest Town	Variety of Ore	Quantity
2	Raimund No. 1	Lipscomb	Hematite	471,264
1	Woodward No. 1, 2, & 3	Bessemer	Hematite	217,503
3	Songo	Songo	Hematite	173,578
4	Raimund No. 2	Bessemer	Hematite	159,043
5	Greeley	Greeley	Brown Ore	141,577
6	Steinman	Steinman	Hematite	126,695
7	Crudup	Gadsden	Hematite	122,651
8	Ironaton	Ironaton	Brown Ore	93,980
9	Docray	Docray	Brown Ore	77,169
10	Houston	Rickey	Brown Ore	68,763
11	Attalla	Attalla	Hematite	63,604
12	Tannehill	Goethite	Brown Ore	55,512
Total (12 mines)				1,771,339
Unspecified* (6 mines)				2,526,390
Total of mines (23) producing less than 50,000 tons				468,816
Grand Total				4,766,545

*Includes the product of 6 mines producing over 50,000 tons each, operated by 2 companies, which do not permit the publication of individual statistics.

PIG IRON.

Quantity and value of pig-iron marketed, by the five States in rank, in the United States in 1911 and 1912, with increase and percentage of increase in 1912, in long tons.

State	1911		1912		Increase in 1912		% of Increase in 1912	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Pennsylvania	9,581,109	\$136,328,507	12,437,685	\$181,569,299	2,856,576	\$45,240,792	29.81	33.19
Ohio	5,371,378	73,484,592	7,127,176	93,140,369	1,755,798	19,655,777	32.69	26.75
Illinois	2,036,081	31,152,927	2,806,378	42,828,816	770,297	11,675,889	37.83	37.48
Alabama	1,617,150	17,379,171	1,987,753	21,371,053	370,603	3,991,882	22.92	22.97
New York	1,537,201	23,924,194	1,973,090	28,059,058	435,889	4,134,864	28.36	17.28

LIME.

C. A. ABELE.

ALTHOUGH the production of 1912 was 4.65 per cent greater than that of 1911, the increase was not sufficient to bring the total up to the amount of the 1910 production. The total product of 13 operators in 1912 was 79,957 short tons, an increase over 1911 of 3551 tons, or 4.65 per cent. The value of the product was \$297,178, a decrease of \$3,609, or 1.20 per cent.

Below is a table presenting some data on the lime production of 1911 and 1912.

Production of lime in 1911 and 1912.

	Number of Operators	Quantity (Short Tons)	Rank of State by Quantity	Value	Rank of State by Value	Average Price Per Ton	Percentage of Total U. S. Value
1911 -----	13	76,406	15	300,787	16	3.94	2.19
1912 -----	13	79,957	14	297,178	17	3.72	2.13
Increase or decrease -----		3,551		3,609			
Percentage -----		4.65		1.20			

The most important use of the lime produced, as in 1911, was for building purposes, more than 65 per cent of the total product being used for this purpose, the remaining portion being used in chemical plants, sugar refineries, tanneries, for fertilizer, or was distributed through dealers.

Shelby county was again the largest producer, having produced 47,859 short tons or over 59 per cent of the total production. The other producers in the order of their rank were Etowah, Blount, Calhoun, and Jefferson counties.

Following is an outline of some of the chemical processes in which lime may be used:

Chemical uses of lime.

E. F. Burchard.

Agricultural industry: - As a soil amendment, c. m.* - As an insecticide, c. m. - As a fungicide, c. m.	Miscellaneous manufactures: - Rubber, c. m. - Glue, c. m. - Pottery and porcelain, c. m. - Dyeing fabrics, c. m. - Polishing material, c. m.
Bleaching industry: - Manufacture of bleaching powder, "Chloride of lime," c. - Bleaching and renovating or rags, jute, ramie, and various paper stocks, c. m.	Oil, fat, and soap manufacture: - Manufacture of soap, c. - Manufacture of glycerine, c. - Manufacture of candles, c. - Renovating fats, grease, tallow, butter, c. m. - Removing the acidity of oils and petroleum, c. m. - Lubricating greases, c. m.
Caustic alkali industry: Manufacture of soda, potash, and ammonia, c.	Paint and varnish manufacture: - Cold-water paint, c. m. - Refining linseed oil, c. m. - Manufacture of linoleum, c. m. - Manufacture of varnish, c. m.
Chemical industries: - Manufacture of ammonia, c. - Manufacture of calcium carbide, calcium cyanimid, and calcium nitrate, c. - Manufacture of potassium dichromate and sodium dichromate, c. - Manufacture of fertilizers, c. m. - Manufacture of magnesia, m. - Manufacture of acetate of lime, c. - Manufacture of wood alcohol, c. - Manufacture of bone ash, c. m. - Manufacture of calcium carbides, c. - Manufacture of calcium-light pencils, c. - In refining mercury, c. - In dehydrating alcohol, c. - In distillation of wood, c.	Paper industry: - Soda method, c. - Sulphite method, m. - For strawboard, c. m. - As a filler, c. m. Preserving industry: - Preserving eggs, c.
Gas manufacture: Purification of coal gas and water gas, c. m.	Sanitation: - As a disinfectant and deodorizer, c. - Purification of water for cities, c. - Purification of sewage, c.
Glass manufacture: Most varieties of glass and glazes, c.	Smelting industry: Reduction of iron ores, c. m.
Milling industry: Clarifying grain, c. m.	Sugar Manufacture: - Beet root, c. - Molasses, c. Tanning industry: - Tanning cowhides, c. - Tanning goat and kid hides, c. m. - Water softening and purifying, c.

*High calcium lime is indicated by "c," magnesian and dolomitic lime by "m."

MINERAL WATERS.

G. C. MATSON.

RETURNS from Alabama spring owners show that the output of mineral water declined both in quantity and in value during 1912. The total sales decreased from 205,854 gallons, valued at \$26,982, in 1911, to 165,678 gallons, valued at \$20,435, in 1912, a decline of 19.52 per cent in quantity and 24.26 per cent in value. The average price reported was 12.3 cents a gallon, against 15 cents as the average for 1911. Six new springs were reported during 1912, making a total of 16 springs. About one-half of the total sales of mineral water is used medicinally, and the water at six springs is said to be used for bathing purposes. In addition to the quantity reported as sold, 35,000 gallons were used for the manufacture of soft drinks.

The following 16 springs reported sales:

Alabama Mineral Springs, near Oakhill, Wilcox County.
Bailey Springs, Florence, Lauderdale County.
Bladon Springs, Bladon Springs, Choctaw County.
Blount Springs, Blount Springs, Blount County.
Bromberg Gulf Coast Lithia Springs, Bayou La Batre, Mobile County.
Cherokee Spring, near Citronelle, Mobile County.
Cooks Springs, Cooks Springs, St. Clair County.
Dixie Spring, Dixie Spring, Walker County.
Ingram Lithia Wells, near Ohatchee, Calhoun County.
Livingston Mineral Springs, Livingston, Sumter County.
Luverne Spring, Luverne, Crenshaw County.
MacGregor Spring, Spring Hill, Mobile County.
Matchless Mineral Wells, east of Greenville, Butler County.
Purity Spring, Spring Hill, Mobile County.
Shocco Spring, near Talladega, Talladega County.
White Sulphur Wells, near Jackson, Clarke County.

The following table shows the relative productions, and their respective values, for 1911 and 1912.

Production and value of mineral waters in 1911 and 1912.

	No. of Springs	Quantity Sold (Gallons)	Average Retail Price	Value of Medicinal Waters	Value of Table Waters	Total Value of Mineral Waters	Percentage of Total U. S. Value
1911 -----	10	205,854	\$0.15	\$20,244	\$6,738	\$26,982	0.39
1912 -----	16	165,678	0.123	9,610	10,825	20,435	0.30
Increase or decrease -----	+ 6	+40,176	-----	-10,634	+4,087	-6,547	-----
Percentage -----		- 19.52	-----	- 52.53	+60.65	-24.26	-----

SAND AND GRAVEL.

THE total production of sand and gravel in the State in 1912 was 852,943 short tons, valued at \$268,111, as compared with 677, 894 short tons, valued at \$215,413 in 1911, a net increase in quantity of 175,049 short tons, or 25.82 per cent, and an increase of \$52,698 or 24.46 per cent in value.

The production of sand was short 11,182 tons from 1911, but the value of the product increased \$7,492 or 6.25 per cent. Both the production and the value of gravel increased approximately 50 per cent, which is all the more remarkable when it is noted that chert for road-building was not taken into consideration as in former years.

The following tables give the production, value, and disposition of the sand and gravel produced in 1911 and 1912, and a comparison of the production and value in these years.

Production (in short tons) and value of sand in 1911 and 1912.

	Molding Sand		Building Sand		Paving Sand		Furnace Sand		Engine Sand		Other Sand		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1911	52,766	\$19,432	201,214	\$70,284	10,975	\$3,635	36,540	\$7,738	39,520	\$11,106	17,883	\$7,563	356,293	\$119,758
1912	51,107	28,284	205,498	66,586	37,801	14,497	---	---	45,000	13,300	15,705	7,083	355,111	127,250
Increase or decrease	-1,659	+8,852	+4,284	-3,698	+26,826	+10,862	---	---	+5,480	+2,194	-2,183	-480	-11,182	+7,492
Percentage	-3.18	+45.11	+2.03	-5.26	+244.43	+298.82	---	---	+13.86	+19.75	-12.20	-6.34	-1.26	+6.25

Production of Sand and Gravel in 1911 and 1912.

	Sand		Gravel		Total		Total U. S. Value Percentage of
	Quantity	Value	Quantity	Value	Quantity	Value	
1911 -----	356,293	\$119,758	321,601	\$95,655	677,894	\$215,413	1.018
1912 -----	345,111	127,250	497,832	140,861	852,943	268,111	1.16
Increase or decrease	-11,182	+ 7,492	+176,231	+45,206	+175,049	+52,698	-----
Percentage -----	- 3.14	+ 6.25	+ 54.79	+ 47.25	+ 25.82	+ 24.46	-----

STONE.

E. F. BURCHARD.

THE figures presented in the following report have to do with the stone produced and sold by the quarrymen and include only such manufactured product as is put on the market by the quarrymen themselves. This applies especially to rough and dressed building stone, dressed monumental stone, crushed stone, flagstone, curbstone, and paving block. The value given to this manufactured product is the price received by the producer, free on board at point of shipment, and includes therefore the cost of labor necessary to dress the stone. The stone reported as sold rough includes stone sold as rough stock to monumental works, and to cut-stone contractors for building purposes; stone sold as riprap, rubble, and flux; and includes the value of only such labor as is required to get the stone out of the quarry in the shape required by the purchaser. The value given to this stone is the price received by the quarryman free on board at point of shipment. In case the stone is sold to local trade the value is given as the quarryman sells the material, generally at the quarry, but in some cases delivered, if this is done by the producer. In some instances a long haul to market or to the railroad increases the cost of the material, and therefore of the selling price.

PRODUCTION.

C. A. ABELE.

Alabama produces commercially only three kinds of stone, namely, limestone, marble, and sandstone. Of these, the limestone production and value reached the largest proportions, though the value of the limestone produced fell below the figures established in 1910 and 1911. Marble was the only stone whose production showed an increase over that of 1911. The value of the sandstone produced in 1912 was approximately 60 per cent less than the value of the 1911 product.

Below is a table giving the value of the limestone produced in the last five years, from 1908 to 1912, inclusive.

Value of stone production from 1908 to 1912.

Kind	1908	1909	1910	1911	1912
Limestone -----	\$479,730	\$700,642	\$714,516	\$561,798	\$531,085
Sandstone -----	34,099	77,327	109,063	73,195	27,596
Total -----	513,829	777,969	823,579	634,983	558,681

LIMESTONE.

The most important use of the limestone produced in Alabama in 1912, as in 1911, was blast furnace flux, while riprap, road-making, and crushed stone for concrete follow in the order named. The limestone burned into lime or used in the manufacture of Portland cement is not taken account of here, but is included in the value of each of the finished products in whose manufacture it was used.

As thus limited, the total value of limestone produced in 1912 was \$531,085, as compared with \$561,748 in 1911, a decrease of \$30,713 or 5.46 per cent.

The values of the limestone produced in 1911 and 1912, classified according to the uses of the stone, are given in the following table:

Value of Limestone produced in 1911 and 1912.

Use	1911	1912	Increase or Decrease	Percentage
Paving -----	\$170	\$15,700	+ 15,530	—
Riprap -----	10,459	81,361	+ 70,902	677.90
Roadmaking -----	37,511	54,270	+ 16,759	44.67
Railroad Ballast -----	—	14,093	+ 14,093	—
Concrete -----	23,077	26,235	+ 3,158	13.68
Flux -----	458,356	339,166	— 119,190	26.00
Other uses -----	308	60	— 248	80.38
Total -----	561,798	531,085	— 30,713	5.46
Percentage of total U. S. value	1.66	1.44	-----	-----

LIMESTONE FOR BUILDING PURPOSES.

EUGENE A. SMITH.

From the tables above it will be seen that by far the largest part of the limestone for other purposes than lime burning produced in Alabama 1911-1912, has been for flux rock in the iron furnaces. Crushed stone for road making and riprap follow next, and then dressed building stone.

The preparation of cut stone for building purposes in Alabama, while on the increase, is not yet what it should be. Practically all of this material comes from the quarries in the subcarboniferous limestone of the Tennessee Valley, the most important quarries being at Rockwood in Franklin County, operated by Foster-Creighton-Gould Co., of Nashville. This stone is quite similar in appearance, composition, and other qualities to the Indiana stone, and so far as experience in the use of the stone from the two localities in the buildings of the University of Alabama goes, the Alabama stone holds its own under influence of the weather better than does the Indiana stone. Stone steps, door sills, and window sills, buttress caps, etc., of the Alabama stone put in place in 1885 show practically no deterioration in color and wear under foot, and in crumbling and roughening under the influence of the weather, which cannot be said of some portions of the Indiana stone used in buildings erected in 1909-10. The Rockwood quarries have most modern and approved methods of machinery for sawing the stone and handling it in transit to the mills and elsewhere. The stone is of massive formation, of great thickness and extent. Blocks weighing as much as 25 tons, without crack or flaw, are not infrequently quarried, the size of the blocks being practically limited only by the capacity of the hoisting machinery.

The Oolitic variety is most extensively used for building and monumental work. It is of light gray color, uniform grain, and homogeneous texture. It possesses a quality of cheapness, it can be cut to any design required, and is at the same time strong and durable.

At the present time the business at this quarry is confined to the furnishing of rough and sawed stone to the cut stone contractor or dealer.

With the installing of adequate machinery at the quarry for doing the finished work, there should never be any longer any reason for going outside of the State for this quality of stone. Already the material has been very extensively used in public buildings in Mississippi, Tennessee, as well as in Alabama. The only reason why it was not used in the recently erected buildings at the University of Alabama was that at the time these building contracts were let, the quarries furnished only the rough sawn stone and there was not in Alabama any establishment adequately equipped for the dressing of the stone in the quantity needed.

MARBLE.

EUGENE A. SMITH.

The marble of Alabama is of two kinds, crystalline or true marble and non-crystalline.

The crystalline or statuary marble occurs mainly in a narrow valley along the western border of the metamorphic area, extending from Marble Valley in Coosa County, through Talladega into Calhoun. The length of the marble belt through Coosa and Talladega counties is about 50 miles. The width of the valley carrying the marble as a rule is from one quarter to one-half mile, widening in places to a mile and a quarter, for example in the neighborhood of Sylacauga.

The quarries longest known are Gantt's and Herd's near Sylacauga, Nix's near Sycamore, and Taylor's and McKenzie's near Taylor's Mill East of Talladega. From all these marble was quarried before the civil war.

During 1912, only 3 establishments had reported any marble production, viz.: The Alabama Marble Co., at Gantt's Quarry near Sylacauga, the Alabama-Carara Marble Co., near Talladega, and the Moretti-Harrah Marble Co., Sylacauga. Two other companies, however, have made some rather extensive developments and will no doubt report some production later. These are the Eureka Marble Co. (Bishop's) near Talladega Springs; the Alabama Marble Quarries of the Scott Brothers, near Sycamore.

The plant of the Alabama Marble Company at Gantt's Quarry was destroyed by fire in December, 1910, and it was not until the middle of August, 1911, that the rebuilding was completed and production begun.

I think it is fairly safe to say that on the whole the marble from this quarry and immediate vicinity is of the highest grade of commercial white marble now on the market and obtainable in large quantity. There are small quantities of marble produced both in Italy and Vermont that are somewhat freer from coloring matter than the best grades that can be produced in Alabama in any quantity. But on the other hand, the poorest grades in Alabama greatly surpass the poorest grades produced elsewhere, so that the average of the Alabama deposit is probably somewhat higher than that of any other so far developed, not excluding even the marble from the Carara district in Italy. The marble from this State (Gantt's Quarry) has now a well established reputation and has been used in more than 150 important buildings throughout the United States.

It can be seen in the galleries of the National Museum in Washington.

A beautiful quality of variegated limestone or marble—red, pink and white—belonging probably to the Cambrian formation, occurs in Shelby County a mile or two south of Shelby Springs station on the L. & N. railroad, and extending thence southwest for a mile or two. Nothing but prospecting work has been done on this marble. The Trenton limestone in the Appalachian valleys, particularly Jones Valley below Bessemer, contains marble similar to that quarried in the vicinity of Knoxville, Tenn. Also at Pratt's ferry on the Cahaba River in Bibb County a quarry was for many years worked in this formation and turned out a very beautiful quality of marble varying in color from gray through pink, red and brown shades.

A black marble which is exceedingly promising, has been reported and some development work done near Anniston, and at Piedmont, Calhoun County, and some very handsome specimens of cave onyx have been obtained from near Kymulga in Talladega County.

In the Coastal Plain the St. Stephens limestone of the Tertiary holds ledges of hard, almost crystalline rock capable of taking good polish. The colors vary from nearly white, through shades of yellowish into red, and it would make a handsome decorative marble, especially for inside work.

Other limestone formations, such as the Subcarboniferous and the Knox Dolomite, could in places be drawn upon for marble.

It is possible to publish only the total value of the marble produced in the State in 1912, since a classification of the product according to its uses would necessitate the publication of confidential figures. The total value of the marble produced, the product of three operators, was \$283,619 or 3.64 per cent of the total United States value.

The greater portion of the product was used for interior decoration.

SANDSTONE.

The production of sandstone in 1912 suffered a decline of nearly 60 per cent from that of 1911. In fact, so great was the decrease in the production of this stone that it is possible to publish only the total value of the stone produced in order not to divulge figures of single producers given the Survey in confidence.

Rubble, riprap, and crushed stone, and also an insignificant amount of ganister were produced, but in no case did the 1912 production equal that of 1911, the decrease ranging from 34 per cent to 99 per cent.

The total value of the 1913 production was \$27,596 as compared with \$73,195 in 1911, or a decrease of \$42,599 or 58.20 per cent.

SUMMARY.

BECAUSE of the difference in the units of measurement employed in the various branches of the mineral industry, a summation of the production of the year can include only the values of the products. It is also to be noted that a simple summation of all the values of the minerals or mineral products listed in this pamphlet would give a value much in excess of the true value, since in many cases, as, for instance, coal and coke, and iron ore and pig iron and steel, the second product is directly a product of the first, and the value of the first is included in that of the second. To give the values of both as a part of the total would be to repeat, in a measure, at least a partial value of the first or raw product, and would give an erroneous result.

As the Survey has not however, the figures upon which to base an estimate as to the percentage of each product which was used in the manufacture of some other product, the summation of the mineral production of the State, as given here, will be a simple summation of the values reached by the individual branches of the industry.

According to this rather unsatisfactory manner of summation, which does not include the value of the steel produced, the value of the 1912 mineral production and ultimate products was \$60,141,793, as compared with \$52,772,951 in 1911, an increase of \$7,368,842 or 13.96 per cent. This value was still, however, lower than that of 1910 by \$3,066,152 or 4.86 per cent.

In 1912 pig iron was the most valuable product, the others being in the order of their value, coal, coke, iron ore, clay products, cement, limestone, lime, sand and gravel, marble, and miscellaneous, including bauxite, clay, sandstone, graphite, mineral waters, gold and silver, mica, and abrasives.

Below is a tabular presentation of the value of the mineral productions of 1910, 1911 and 1912.

Total value of the mineral production and products in Alabama in 1910, 1911, and 1912.

<i>Year.</i>	<i>Value.</i>
1910 -----	\$63,207,945
1911 -----	52,772,951
1912 -----	60,141,793

A far truer conception of the relative production of 1910, 1911, and 1912 may be obtained by taking the production returns of each branch of the industry, irrespective of the varieties of units of measurement used, forming a percentage for 1911 and 1912 based on the production of 1910, weighting this percentage by the value of the output, thus preparing an index number of each branch.

Proceeding in this manner, the following results are deduced:

Percentage of the production of mineral products (raw and finished) in 1911 and 1912, using the production of 1910 as a base.

<i>Year.</i>	<i>Percentage.</i>
1910 -----	100.0
1911 -----	88.6
1912 -----	84.4

PROBABLE FUTURE PRODUCTION.

The following minerals have been produced in Alabama in past years, but no production was reported for 1912; Fuller's Earth, Manganese Ore, Pyrite, Mineral Paints, Petroleum, Phosphate Rock, and Quartz. Since all these are known to occur in some quantity and of a quality to make them of commercial value, the production may be resumed at any time.

Among the probable productions in the near future, are natural gas and petroleum, onyx marble, turquoise and other minerals noticed in the Index to the Mineral Resources of Alabama a publication of the State Geological Survey.

Natural gas under pressure of 630 pounds has been obtained from several wells in Fayette and Walker Counties, and smaller quantities under less pressure have been obtained near Huntsville and elsewhere.

A Report with map on the Fayette County Gas Field has been published by the survey during the year. No commercial production has yet been reported.

STATEMENT OF WORKING CAPITAL
The following statement shows the working capital of the company as of the end of the year 1923. It is based on the balance sheet and the statement of income for the year ended December 31, 1923.

Working capital is the difference between the current assets and the current liabilities of a company. It is a measure of the company's ability to pay its short-term obligations.

The working capital of the company as of the end of the year 1923 was \$100,000. This was an increase of \$20,000 over the working capital of the company as of the end of the year 1922.

The increase in working capital was due to the following factors: (1) an increase in current assets of \$20,000, and (2) a decrease in current liabilities of \$0. The increase in current assets was due to the collection of accounts receivable and the sale of inventory.



